FIG. 1

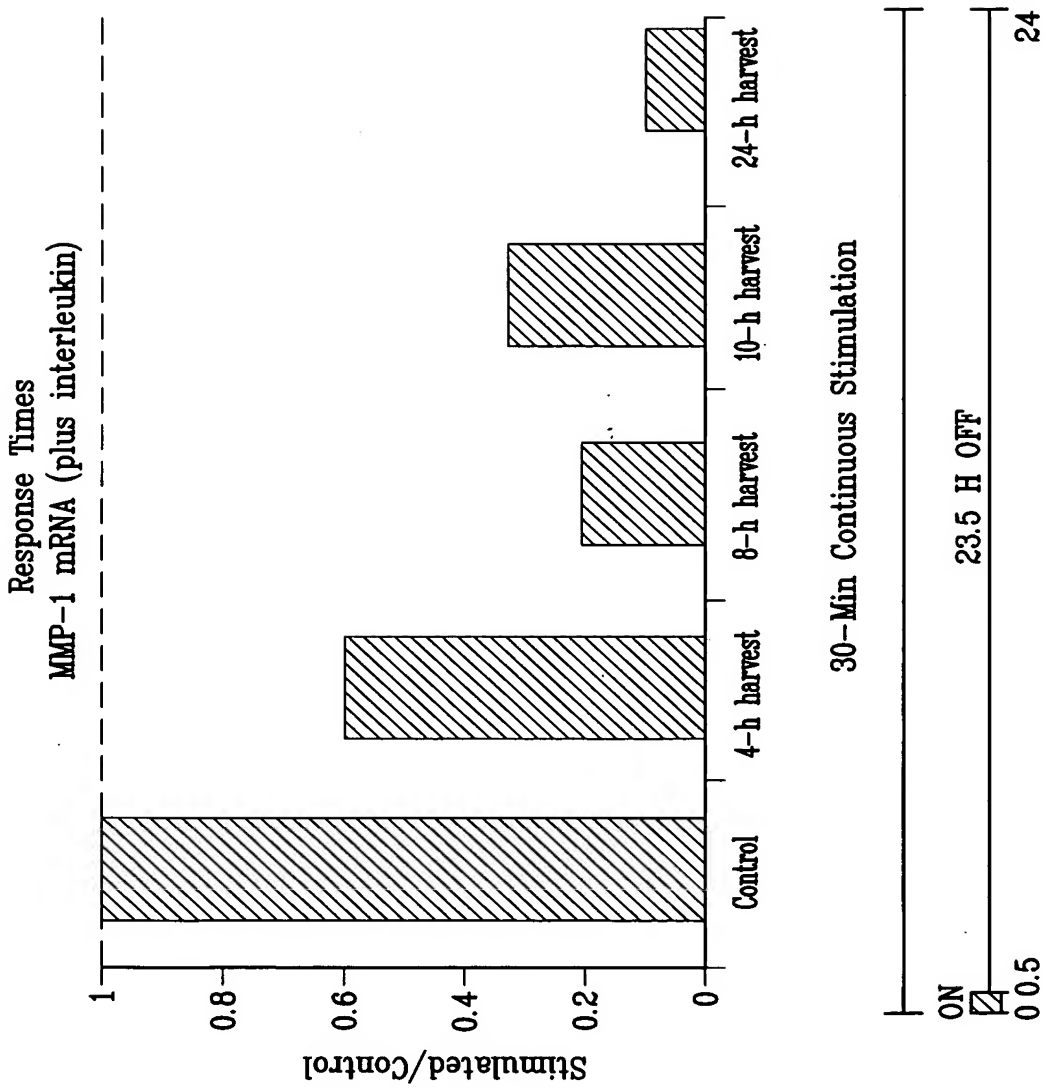


FIG. 2

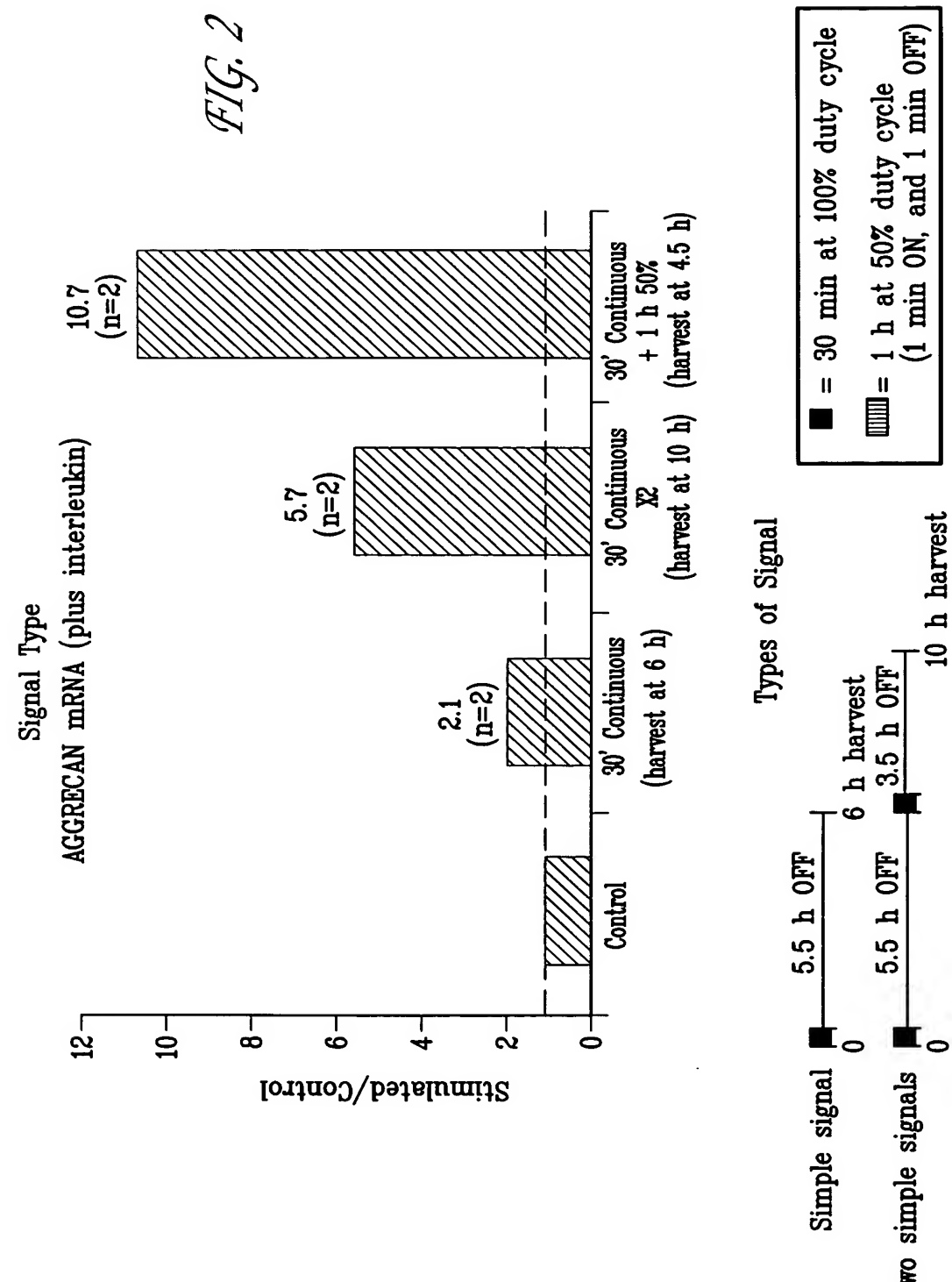

Signal Type
AGGRECAN mRNA (plus interleukin)
Stimulated/Control
12
10
8
6
4
2
0
2.1 (n=2)
5.7 (n=2)
10.7 (n=2)
Control
30' Continuous (harvest at 6 h)
30' Continuous X2 (harvest at 10 h)
30' Continuous + 1 h 50% (harvest at 4.5 h)
Types of Signal
= 30 min at 100% duty cycle
= 1 h at 50% duty cycle (1 min ON, and 1 min OFF)
Simple signal
5.5 h OFF
6 h harvest
Two simple signals
5.5 h OFF
3.5 h OFF
10 h harvest
Compound signal
1.5 h
4.5 h harvest
0

FIG. 3

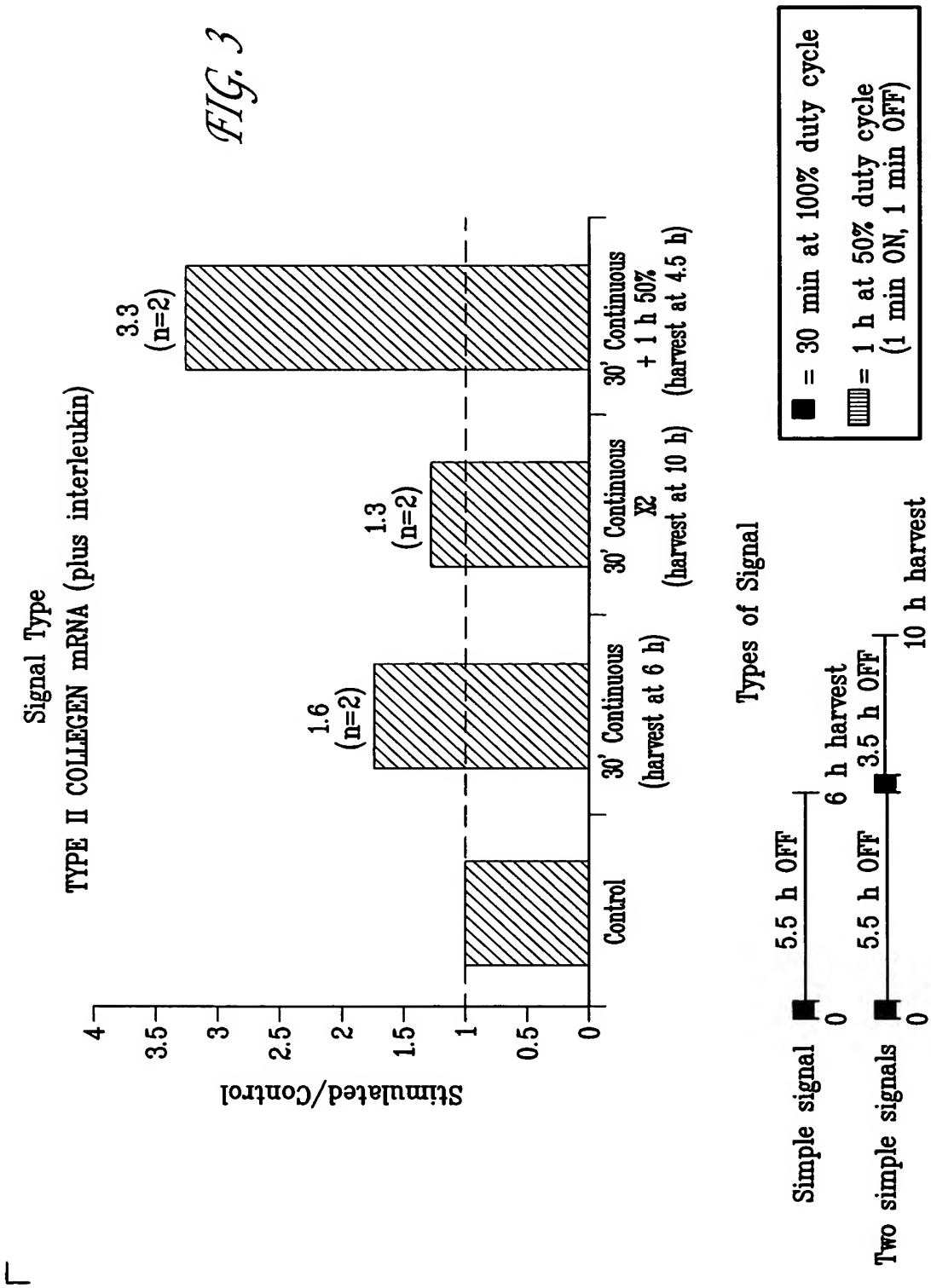

Signal Type
TYPE II COLLEGEN mRNA (plus interleukin)
Stimulated/Control
4
3.5
3
2.5
2
1.5
1
0.5
0
3.3
(n=2)
1.3
(n=2)
1.6
(n=2)
Control
30' Continuous
(harvest at 6 h)
30' Continuous
X2
(harvest at 10 h)
30' Continuous
+ 1 h 50%
(harvest at 4.5 h)
= 30 min at 100% duty cycle
= 1 h at 50% duty cycle
(1 min ON, 1 min OFF)
Types of Signal
Simple signal
5.5 h OFF
0
6 h harvest
Two simple signals
5.5 h OFF
3.5 h OFF
0
10 h harvest
Compound signal
0
1.5 h
4.5 h harvest

FIG. 4

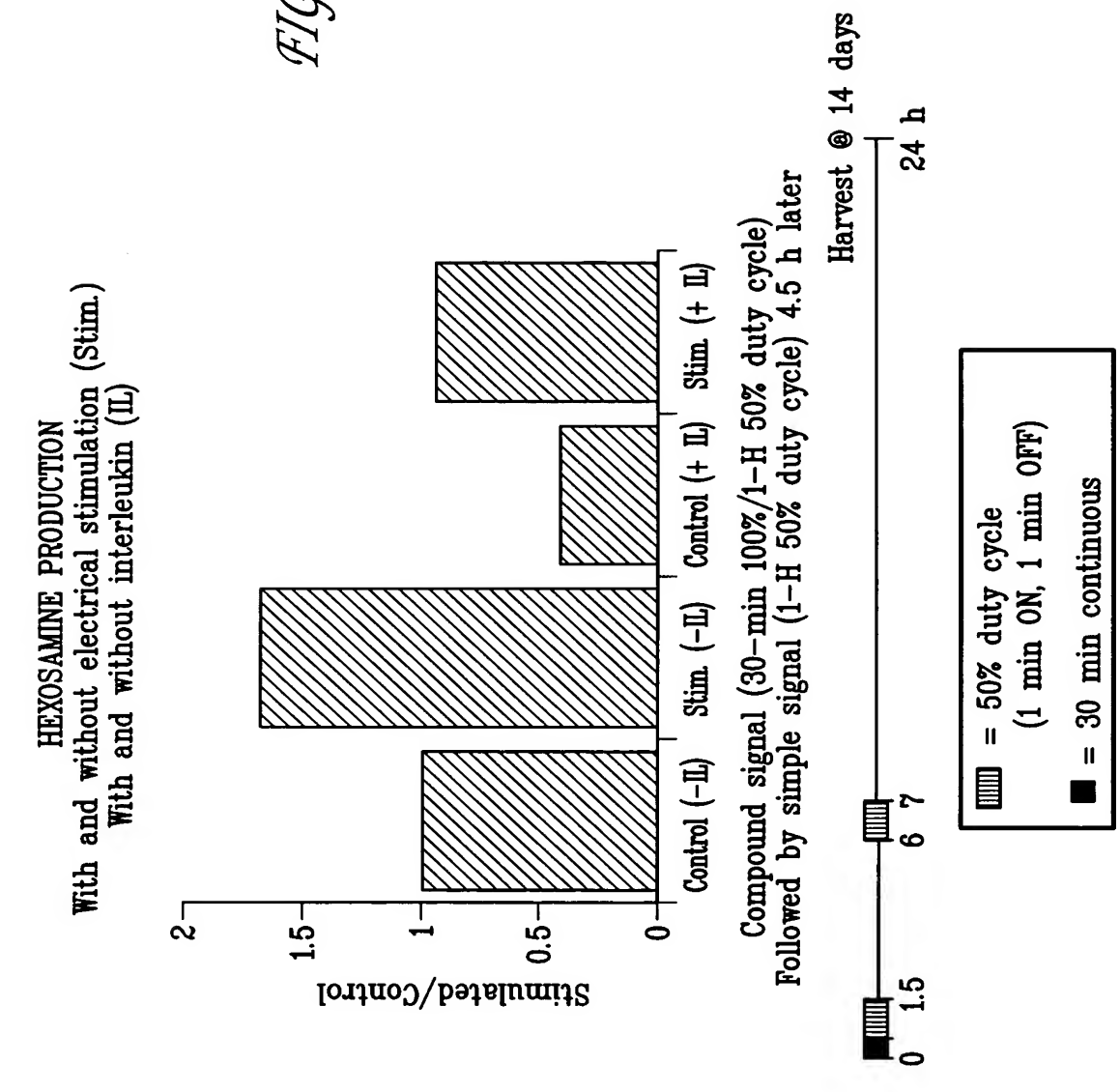

HEXOSAMINE PRODUCTION
With and without electrical stimulation (Stim.)
With and without interleukin (IL)
Stimulated/Control
2
1.5
1
0.5
0
Control (-IL)
Stim. (-IL)
Control (+ IL)
Stim. (+ IL)
Compound signal (30-min 100%/1-H 50% duty cycle)
Followed by simple signal (1-H 50% duty cycle) 4.5 h later
Harvest @ 14 days
0
1.5
6
7
24 h
= 50% duty cycle
(1 min ON, 1 min OFF)
= 30 min continuous

FIG. 5

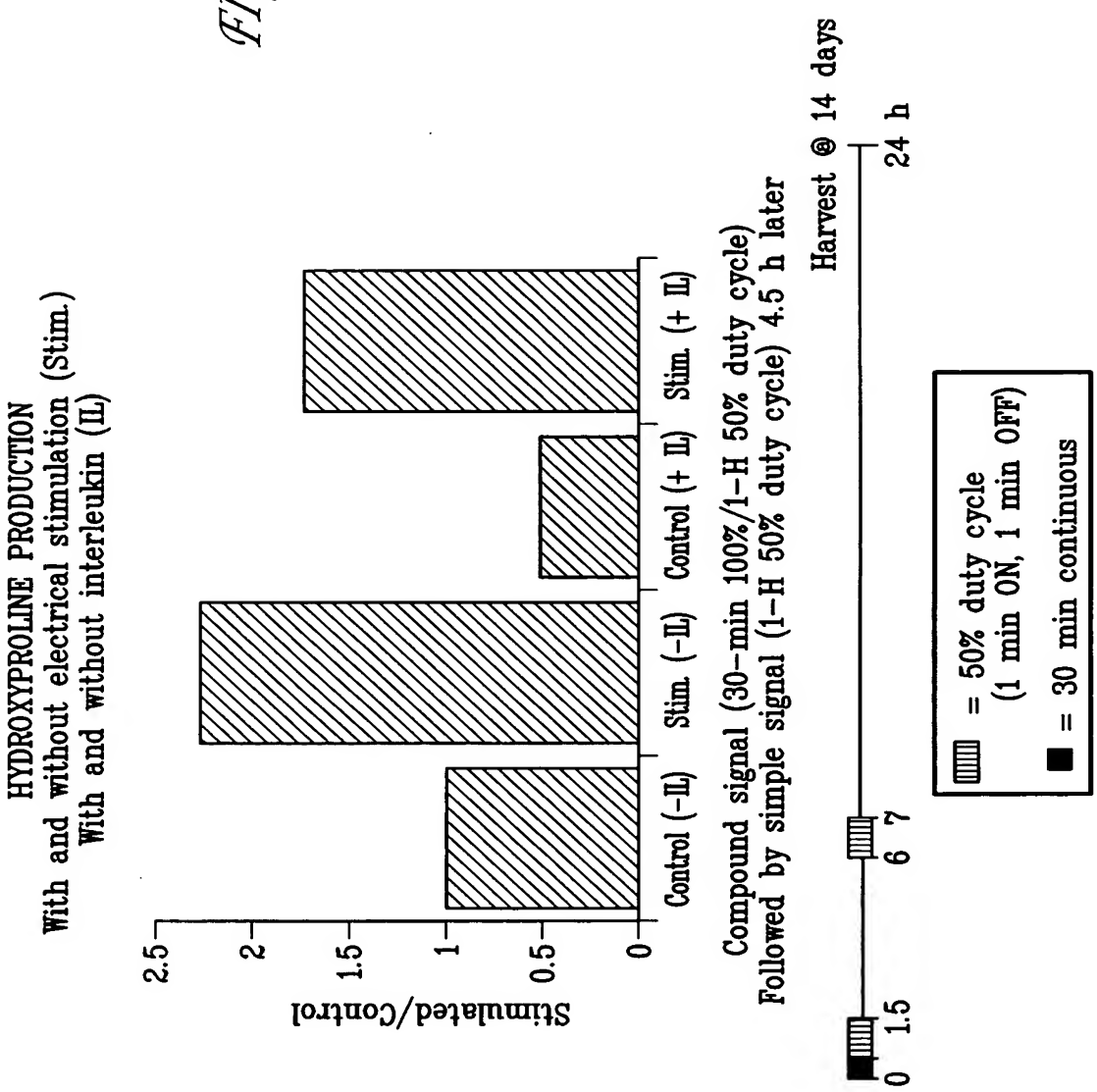

HYDROXYPROLINE PRODUCTION
With and without electrical stimulation (Stim.)
With and without interleukin (IL)
Stimulated/Control
2.5
2
1.5
1
0.5
0
Control (-IL)
Stim. (-IL)
Control (+ IL)
Stim. (+ IL)
Compound signal (30-min 100%/1-H 50% duty cycle)
Followed by simple signal (1-H 50% duty cycle) 4.5 h later
Harvest @ 14 days
0
1.5
6
7
24 h
= 50% duty cycle
(1 min ON, 1 min OFF)
= 30 min continuous

FIG. 6

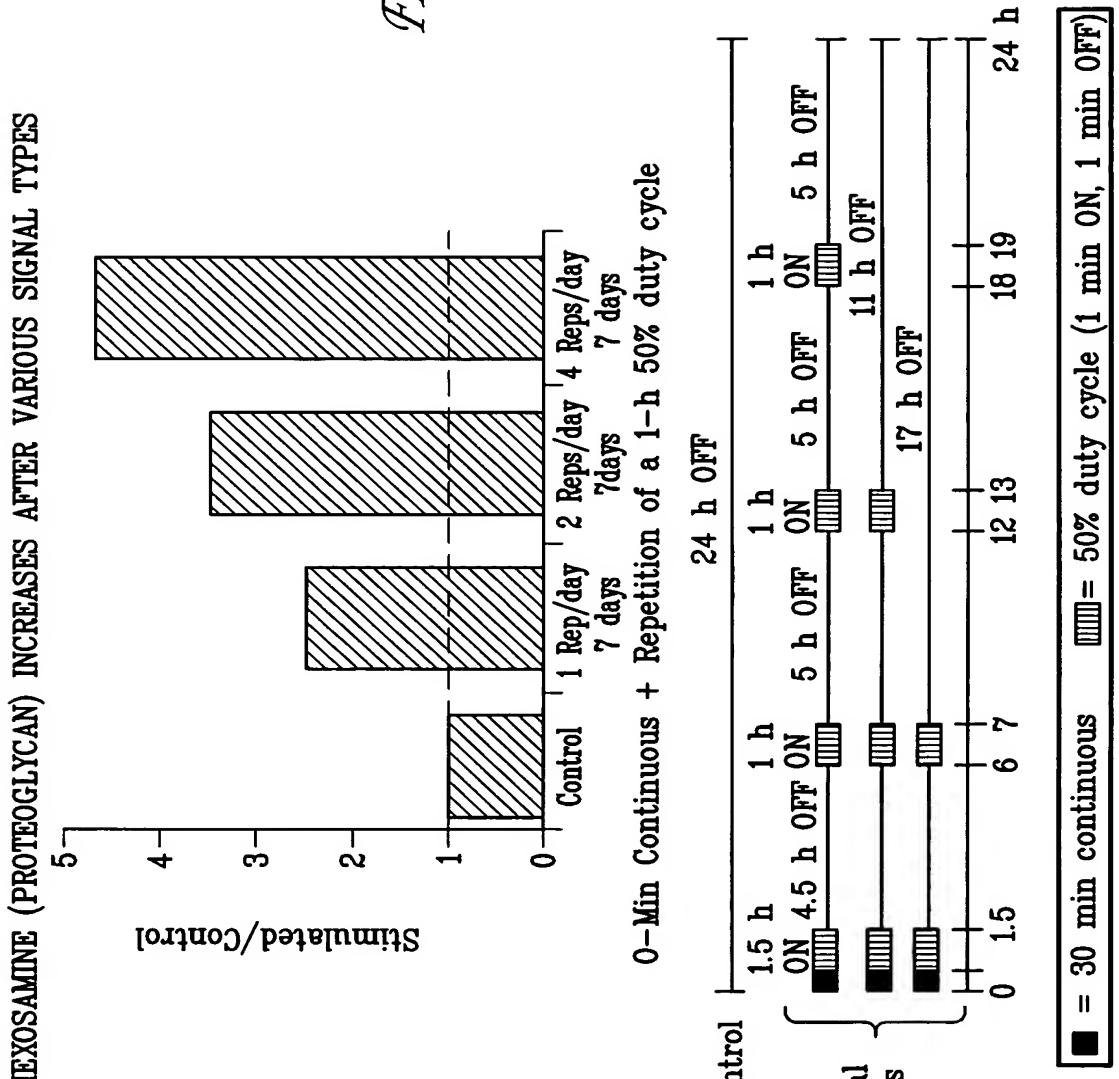

HEXOSAMINE (PROTEOGLYCAN) INCREASES AFTER VARIOUS SIGNAL TYPES
Stimulated/Control
0
1
2
3
4
5
Control
1 Rep/day 7 days
2 Reps/day 7days
4 Reps/day 7 days
0-Min Continuous + Repetition of a 1-h 50% duty cycle
Control
24 h OFF
Singal types
1.5 h ON
4.5 h OFF
1 h ON
5 h OFF
1 h ON
5 h OFF
1 h ON
5 h OFF
17 h OFF
11 h OFF
0
1.5
6
7
12
13
18
19
24 h
= 30 min continuous
= 50% duty cycle (1 min ON, 1 min OFF)

FIG. 7

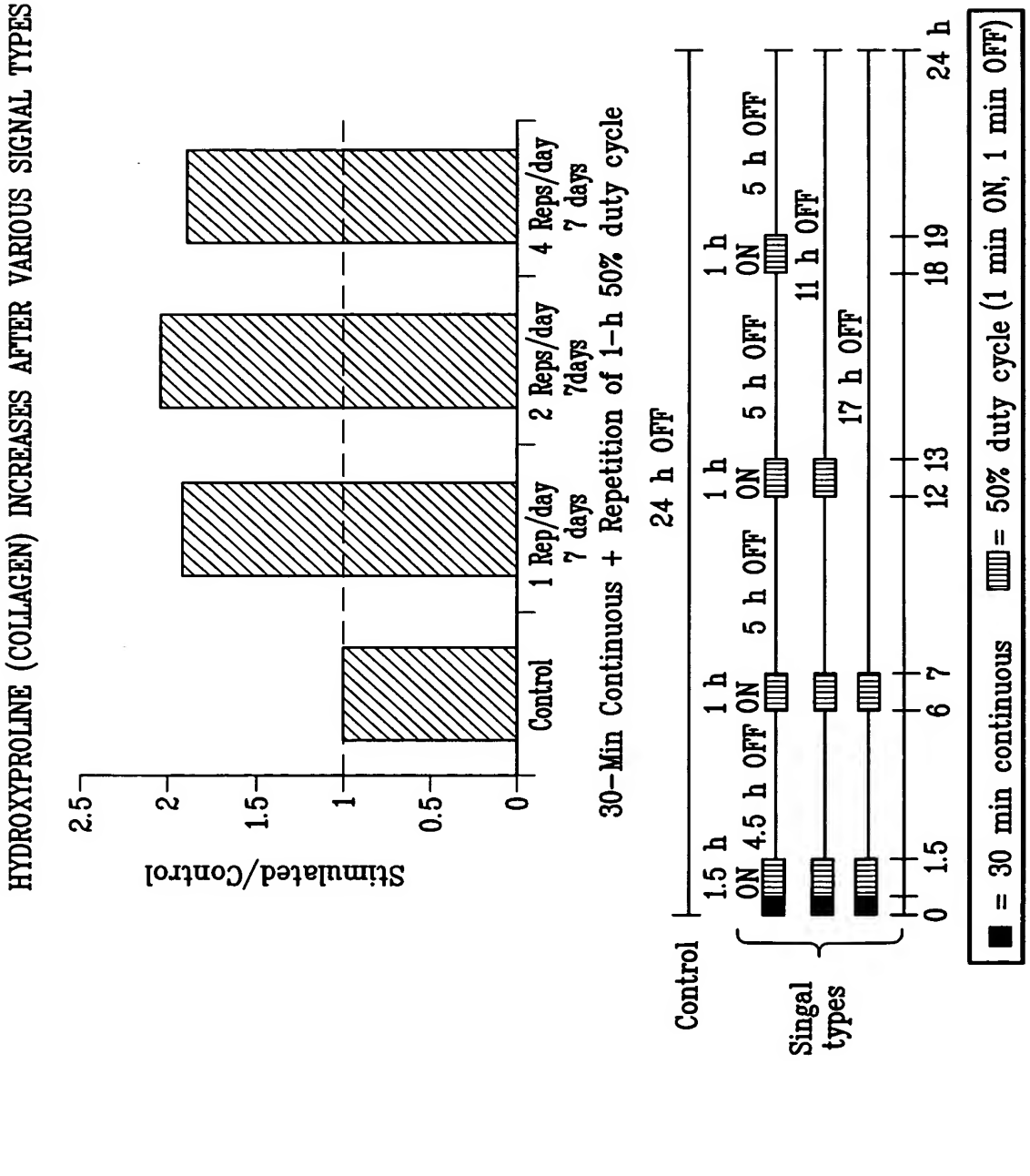
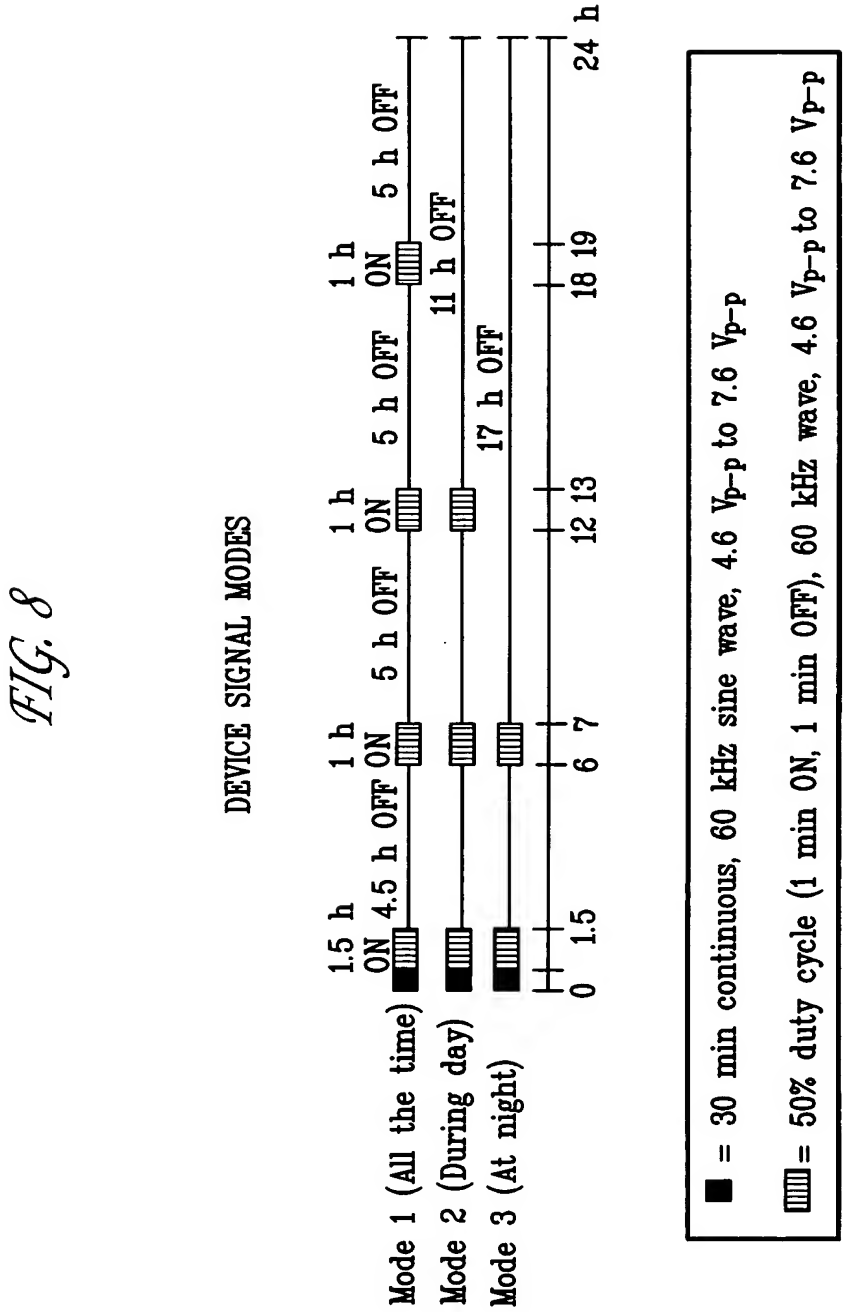

HYDROXYPROLINE (COLLAGEN) INCREASES AFTER VARIOUS SIGNAL TYPES
Stimulated/Control
2.5
2
1.5
1
0.5
0
Control
1 Rep/day 7 days
2 Reps/day 7days
4 Reps/day 7 days
30-Min Continuous + Repetition of 1-h 50% duty cycle
24 h OFF
1 h
1 h
1.5 h ON
4.5 h OFF
ON
5 h OFF
ON
5 h OFF
ON
5 h OFF
17 h OFF
11 h OFF
Singal types
0
1.5
6
7
12
13
18
19
24 h
= 30 min continuous
= 50% duty cycle (1 min ON, 1 min OFF)

FIG. 8


DEVICE SIGNAL MODES
1.5 h ON
4.5 h OFF
1 h ON
5 h OFF
1 h ON
5 h OFF
1 h ON
5 h OFF
Mode 1 (All the time)
Mode 2 (During day)
17 h OFF
Mode 3 (At night)
11 h OFF
0
1.5
6
7
12
13
18
19
24 h
■ = 30 min continuous, 60 kHz sine wave, 4.6 Vp-p to 7.6 Vp-p
▥ = 50% duty cycle (1 min ON, 1 min OFF), 60 kHz wave, 4.6 Vp-p to 7.6 Vp-p

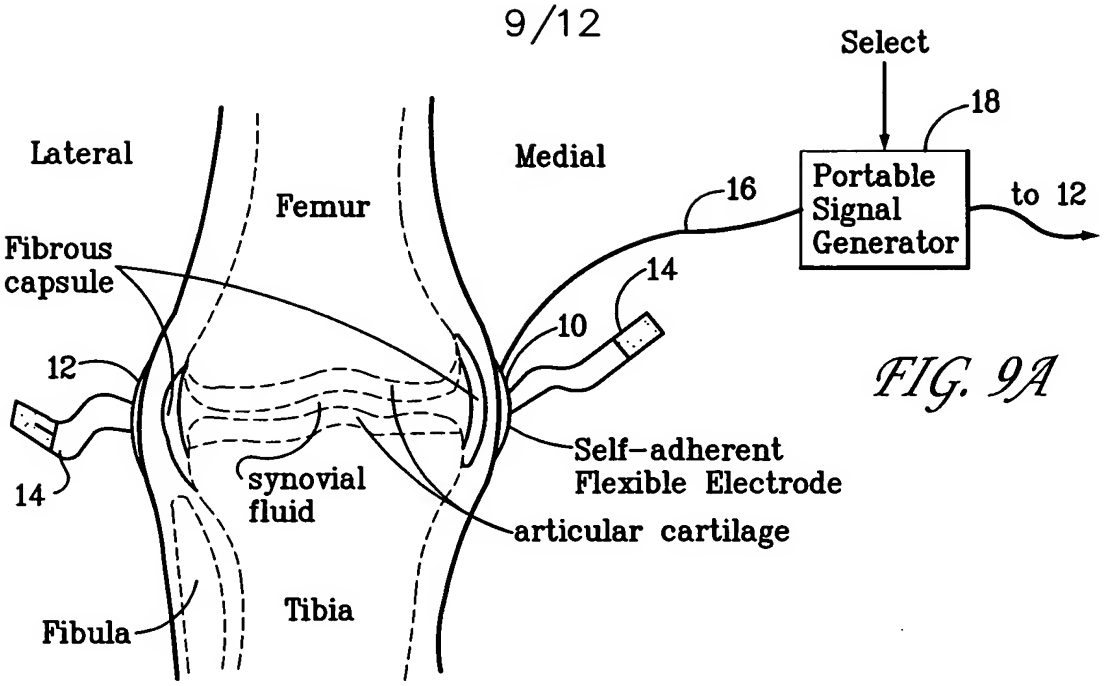

Select
18
Lateral
Medial
Femur
16
Portable Signal Generator
to 12
Fibrous capsule
14
10
12
14
synovial fluid
Self-adherent Flexible Electrode
articular cartilage
Tibia
Fibula

FIG. 9A

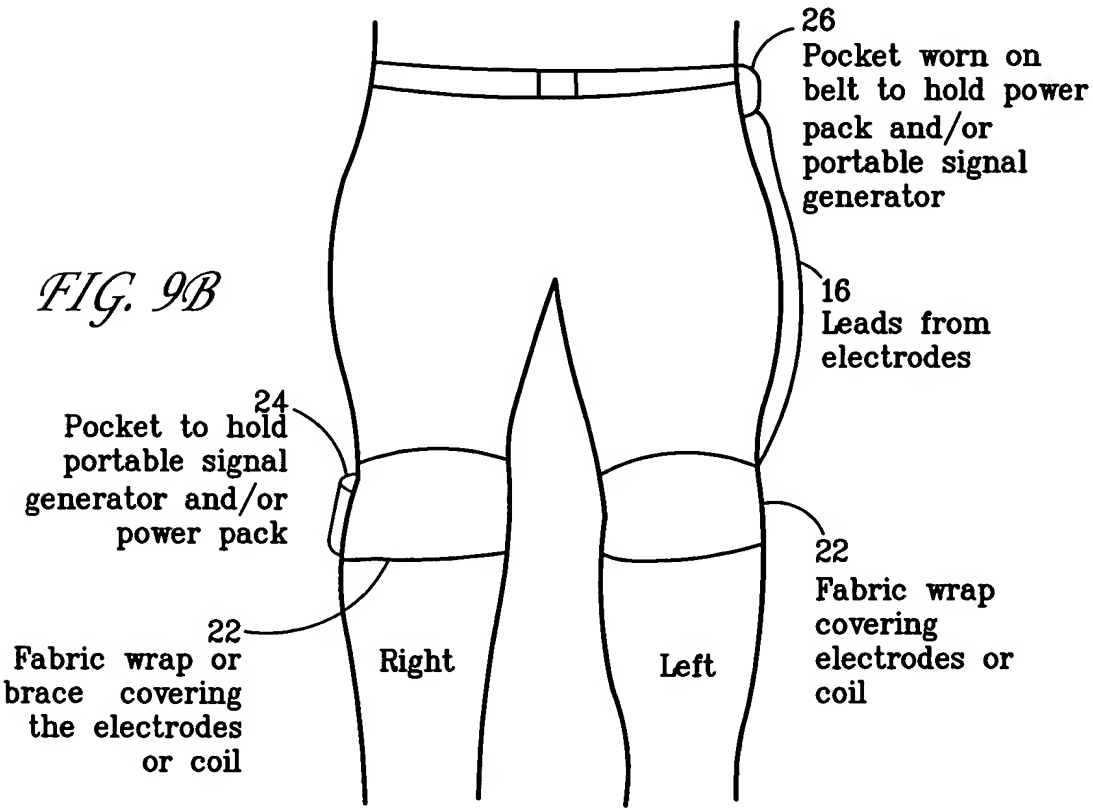

26
Pocket worn on belt to hold power pack and/or portable signal generator
16
Leads from electrodes
24
Pocket to hold portable signal generator and/or power pack
22
Fabric wrap covering electrodes or coil
22
Fabric wrap or brace covering the electrodes or coil
Right
Left

FIG. 9B

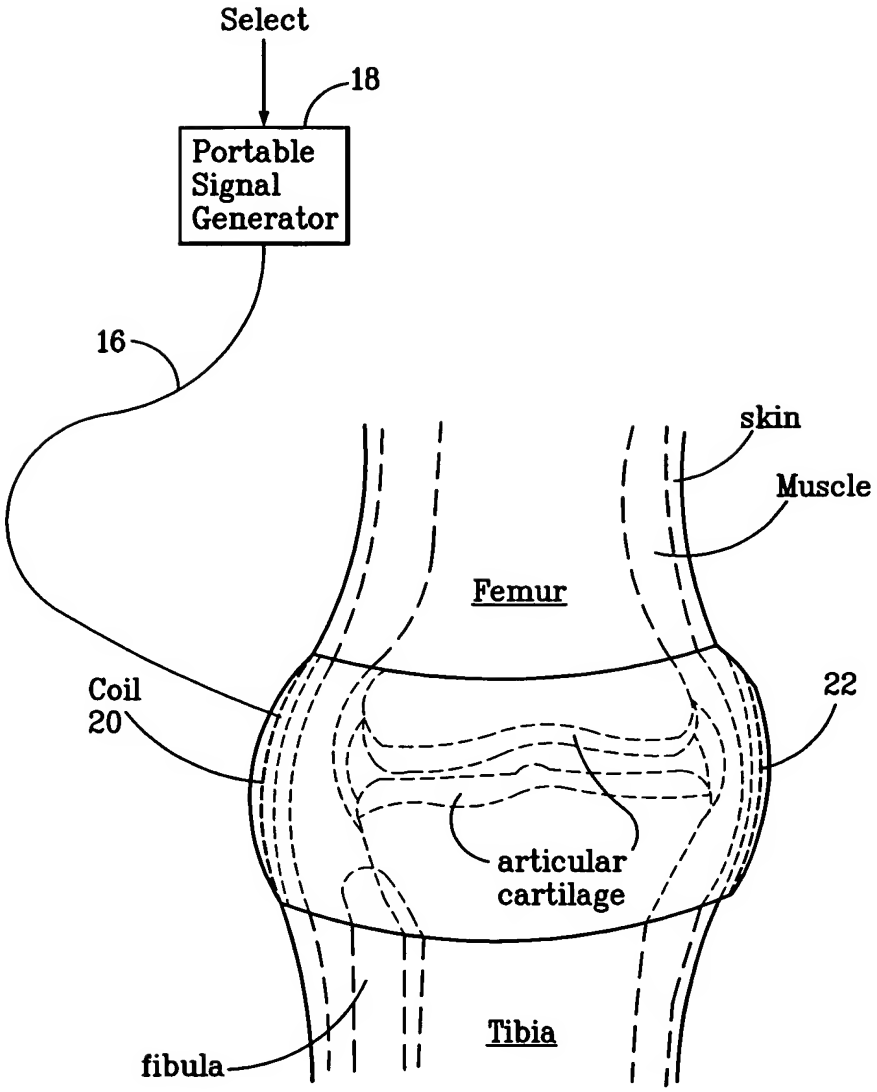

Select
18
Portable Signal Generator
16
skin
Muscle
Femur
Coil
20
22
articular cartilage
Tibia
fibula

FIG. 9C

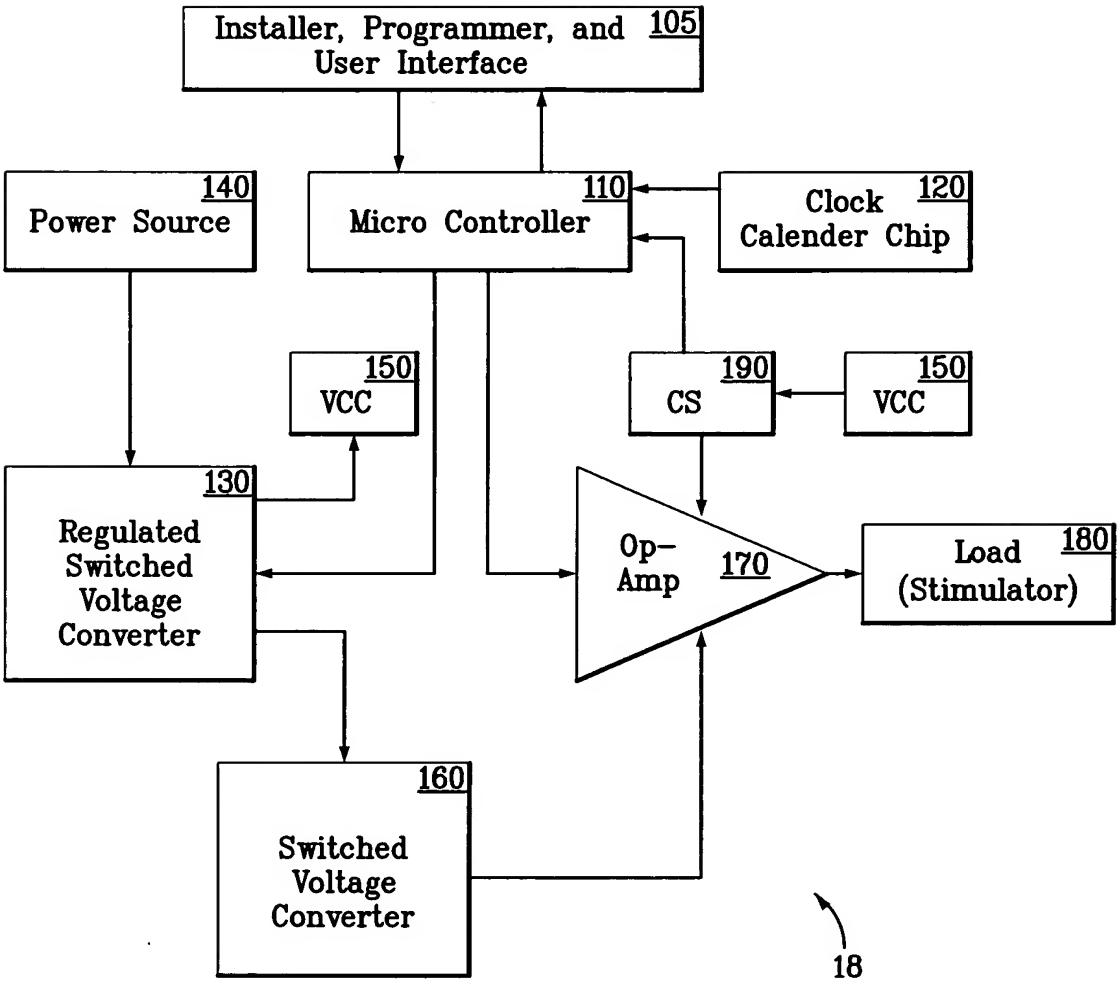

Installer, Programmer, and User Interface
105
140
Power Source
110
Micro Controller
120
Clock Calender Chip
150
VCC
190
CS
150
VCC
130
Regulated Switched Voltage Converter
Op-Amp
170
180
Load (Stimulator)
160
Switched Voltage Converter
18

FIG. 10

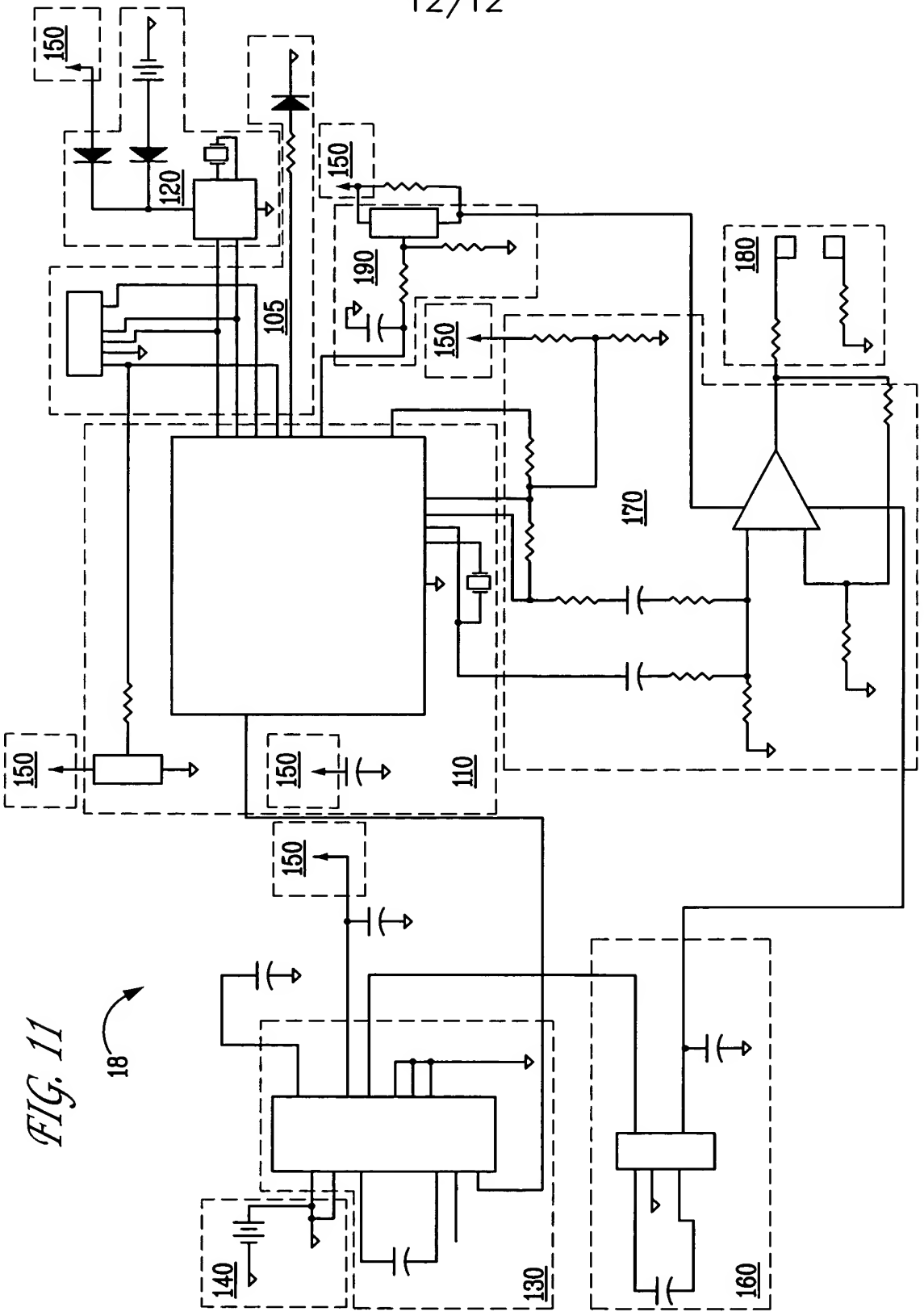


FIG. 11